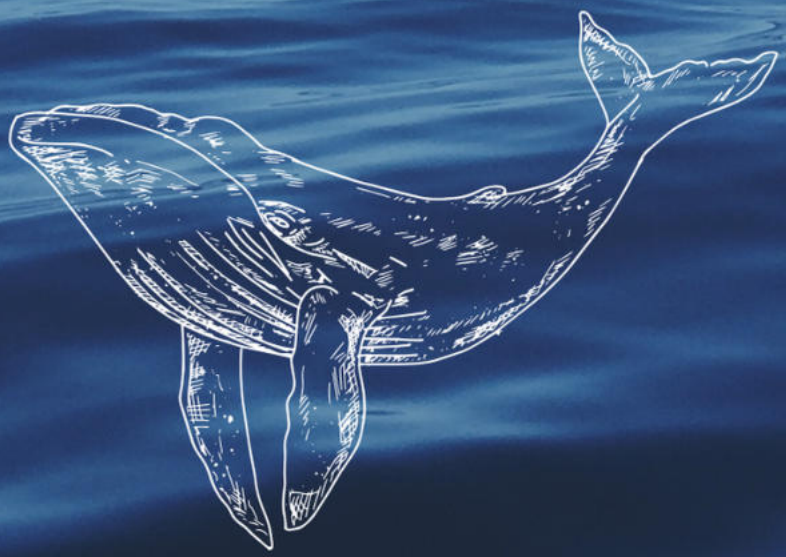
SEA-LAND AWARENESS GUIDE

BlueLightS

InlandBlue - Sustainability and Preservation of the Marine Environment. Blue Schools in Inland Areas



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1. INTRODUCTION

The main aim of the project is to highlight, reflect and actively raise awareness among students from schools in inland Spain, specifically four primary and secondary schools, about the current situation of aquifers, seas and oceans, in order to jointly seek solutions to address the climate emergency we are experiencing. The schools belong to different autonomous communities: Community of Madrid and Castilla La Mancha. These schools are: Luis Vives Infant and Primary School (Alcalá, Madrid), Parque Vallejo Infant and Primary School (Alovera, Guadalajara), Francisca de Pedraza Secondary School (Alcalá, Madrid) y Harévolar Secondary School (Alovera, Guadalajara).

Despite the urgent need to engage inland populations in protecting marine environments, there are currently no inland Blue Schools in Spain. This project aims to change this by establishing lasting networks and meaningful partnerships between schools, as well as through specific activities. The overarching aim is to foster a shared commitment to conserving the oceans and marine ecosystems, while promoting education on climate change. To this end, the project is framed as a Service-Learning (SL) initiative that applies Cooperative Learning methodologies.

This document presents the project's final outcome: a Sea-Land Awareness Guide created by the students to raise awareness in other schools and within the broader community. Drawing on the knowledge, reflections and actions developed throughout the project, the guide aims to encourage deeper engagement with protecting oceans and freshwater systems, even in inland regions. The guide is both an educational product and a meaningful act of community service, fully aligned with the principles of service learning and cooperative learning.

2. ACTIVITIES IN INLAND SCHOOLS

2.1. ACTIVITY 1 - WASTE CATEGORIZATION AND MANAGEMENT

This workshop featured a brief presentation about different waste types and proper categorization to improve recycling practices, not just in schools, but also at home and in daily life. Through cooperative group work, students reflected on how everyday actions, even far from the coast, can negatively impact seas and oceans.

The activity involved real waste materials sent by Blue Schools in Mallorca, which the students had to identify and sort into the correct recycling bins. For schools without this partnership, we have created visual templates of various waste items in Canva (Annex I) to make the activity more engaging and accessible.

Learning Objectives:

1) Raise inland communities' awareness about how daily habits affect marine environments.
2) Understand how inland regions can contribute to ocean conservation.
3) Practice hands-on waste identification and sorting.
4) Reflect on the importance of proper waste separation across different settings

2.2. ACTIVITY 2 - THE MONITORING OF THE WATER QUALITY OF A LOCAL RIVER

The aim of this activity is to analyse the quality of the water and assess its condition. To achieve this, the class will be divided into four groups using the expert group technique. Each group is responsible for measuring a specific water parameter: hardness, iron, chlorine or phosphate. After analysing these parameters in their groups, the students must evaluate whether the results are positive or negative and present their findings to the rest of the class. Finally, based on these presentations, the class will determine whether the river's water quality is acceptable.

Important: Dilute the collected water sample tenfold before taking measurements. If there has been significant rainfall in the area, dilution may not be necessary. If in doubt, test the first measurement with and without dilution to decide how to proceed.)

MEASUREMENT INSTRUCTIONS

Free Chlorine Test (mg/L or ppm) – HI3831F Test Kit

Note: The kit includes other containers not needed for this activity. Only use the ones specified.

Fill the sample cell with 10 mL of the water to be tested.

Add 5 drops of Reagent 1 and gently swirl.

Add 5 drops of Reagent 2 and swirl again.

Compare the resulting color in the sample cell with the color comparison cube to determine the concentration of free chlorine.

Iron Test (mg/L or ppm) – HI3834-0 Reagent

Fill the plastic vessel with 10 mL of the water sample.

Add the contents of one iron reagent packet and stir until fully dissolved.

Wait 3 minutes for the color to develop.

Compare the resulting color with the color comparison cube to determine the iron concentration.

Phosphate Test (mg/L or ppm) – HI3833-0 Reagent

Fill the plastic vessel with 10 mL of the water sample.

Add the contents of one phosphate reagent packet and stir until fully dissolved.

Wait 5 minutes for the color to develop.

Compare the resulting color with the color comparison cube to determine the phosphate concentration.

Hardness Test – Low Range (mg/L or ppm) – HI3840-0 Test Kit

Fill the plastic vessel with 50 mL of the water sample.

Add 1 drop of Calmagite indicator and stir.

Add drops of the low-range hardness reagent (HI3840-0), swirling the sample after each drop, and count the drops until the color changes from pink to blue.

Calculate total hardness by multiplying the number of drops by 5. The result is expressed in mg/L (ppm) as $CaCO_3$.

2.3. ACTIVITY 3 - THE EFFECT OF MICROPLASTICS ON MICROORGANISMS

The aim of this activity is to understand the effect of microplastics on microorganisms, with a specific focus on Daphnia magna, commonly known as the water flea. Before the workshop begins, students are encouraged to reflect on their initial thoughts and awareness of the amount of plastic used in everyday life, particularly during the early morning, for example at breakfast time.

After listing the various plastic items, they typically use, the session will be divided into two main parts.

1) General presentation: This includes an introduction to microplastics, how they reach the ocean and what microorganisms are.
2) Hands-on activities organized into three interactive stations:
    - Station 1: Visible plastics (e.g. bottles) and microplastics that can be seen with the naked eye.
    - Station 2: Observing microplastics under a magnifying glass.
    - Station 3: Analysis of Daphnia magna. Students will examine samples in colour-coded test tubes:
        - Yellow tubes: Contain Daphnia magna that have been exposed to microplastics.
        - Orange tubes: Contain Daphnia magna that have not been exposed to microplastics and have only been fed algae (control group). Prior to the experiment, the same number of organisms were placed in each group by the teachers.



The aim of the experiment is to observe how the presence of microplastics reduces the population of these organisms compared to those not exposed to them.

Learning objectives:

1) Reflect on the excessive use of plastics in daily life.
2) Learn what microplastics are, where they come from and how they enter the environment.
3) Understand how microplastics pollute aquatic ecosystems and affect marine life.
4) Learn about aquatic microorganisms, specifically Daphnia magna, and their role as bioindicators of pollution.
5) Analyze the impact of microplastics on the survival of microorganisms.
6) Connect theoretical concepts with real-world environmental issues.
7) Take away the knowledge and tools to encourage responsible actions to reduce plastic consumption in daily routines.

2.4. ACTIVITY 4 - THE PRINCIPLES OF THE CIRCULAR ECONOMY OR BLUE ECONOMY

This activity focused on exploring the concepts of the circular and blue economies, addressing the following key topics:

- Understanding the circular economy, including its environmental, economic and social benefits.
- The 3Rs rule (Reduce, Reuse, Recycle) and the additional R's as a foundation for responsible consumption.
- What the Blue Economy entails, its core principles and its importance in protecting the oceans and marine ecosystems.

- Real-life examples of best practice showcasing how innovative companies are applying these principles.
- Designing circular and blue economy initiatives using materials received monthly from partner schools.

As part of the activity, we reached out to businesses in the sector to learn about their experiences first-hand and request product samples for educational use.

If it is not possible to contact companies, useful resources are provided in Annex II, along with examples of noteworthy businesses that illustrate and demonstrate the principles of the blue and circular economy.

2.5. ACTIVITY 5 – OCEAN ACIDIFICATION

The workshop on ocean acidification began with a brief theoretical introduction, covering definitions, causes and possible solutions. After this, the students carried out a simple experiment to demonstrate the effects of increased atmospheric CO_2 concentrations on ocean acidification.

Some of the CO_2 in the atmosphere is absorbed by the ocean, where it reacts with seawater to form carbonic acid. This acid then breaks down into hydrogen ions and bicarbonate ions. The resulting drop in ocean pH is harmful to many marine organisms that rely on calcium carbonate to build their shells and skeletons. These include corals, sea urchins, clams, oysters and phytoplankton, the latter of which forms the basis of marine food webs. Acidification can also cause stress in more sensitive species due to significant changes in their ecosystems.

Objective:

Demonstrate how acidic environments (e.g. vinegar) affect calcium carbonate structures (e.g. seashells) by simulating the process of ocean acidification.

Steps of the experiment:

1) Prepare three containers:
    - Container 1: Water only (neutral pH ≈ 7) – this will serve as the control.
    - Container 2: Half water and half vinegar (acidic, pH 3–4).
    - Container 3: Pure vinegar (very acidic, pH ≈ 2–3).
2) Add seashells: place seashells (mainly composed of calcium carbonate, $CaCO_3$) into each container.
3) Observation:
    - Neutral water: The shells remain unchanged.
    - Mildly acidic mixture: Some bubbles appear, indicating a slow reaction.
    - Highly acidic vinegar:
        - Intense bubbling indicates the release of carbon dioxide (CO_2).
        - There is sediment at the bottom, which is dissolved shell material (calcium released).

Connection to the real world: As atmospheric CO_2 levels rise, more CO_2 dissolves into seawater, lowering its pH in a process similar to that which occurs when vinegar is added to water in an experiment. Coral reefs, which are also made of $CaCO_3$, begin to dissolve in these acidic conditions. The experiment clearly shows that shell dissolution increases with greater acidity of the water. It demonstrates how human-induced pollution (e.g. CO_2 emissions) poses a serious threat to marine ecosystems.

3. AWARENESS CAMPAIGN

The 'The Sea Starts Here' campaign aims to raise awareness in the local school community about the importance of protecting the seas and oceans. The campaign delivers a clear message: our daily actions, even when far from the coast, have a direct impact on the marine environment. Taking care of the sea starts at home, in our streets and in our schools, through responsible consumption and proper waste management.

Each school developed and led creative, hands-on initiatives tailored to the age and context of the students. These activities combined learning with meaningful action. Some of the most noteworthy included

1) Songs – CEIP Luis Vives and CEIP Parque Vallejo:

Year 4 and 5 primary school pupils wrote and recorded songs about ocean conservation, the dangers of plastic pollution and environmental responsibility. The recordings were shared with the school community, families and partner schools, including those in Mallorca.

2) Artistic murals – CEIP Luis Vives, IES Francisca de Pedraza and IESO Harevolar:

Students created murals using waste materials, which were displayed in school courtyards and corridors.

Students created murals using waste materials, which were displayed in school patios and corridors. These artworks illustrated marine biodiversity and the effects of pollution. They also painted messages such as 'The sea starts here' next to storm drains and gutters to highlight the connection between urban areas and the sea.

3) Educational podcasts – IES Francisca de Pedraza

Year 10 students produced short, informative podcasts. They shared their experiences of exchange visits to Mallorca and reflected on the importance of adopting more sustainable lifestyles. The podcasts were published on the school's website.

4) Environmental Gymkhana – IESO Harevolar

Year 8 students designed educational games focusing on marine conservation, biodiversity and key marine science concepts. These activities were created to be shared with a school outside the project, thereby encouraging collaboration and peer learning.

These initiatives promoted cross-curricular learning and empowered students to become active agents of change. By linking classroom learning to real-world issues, the campaign encouraged critical thinking, environmental awareness and a stronger commitment to sustainability.

4. ANNEX

4.1. ANNEX I


RECEIPT

4.2. ANNEX II

https://www.youtube.com/watch?v=f2uoMa_m3ZU

https://www.youtube.com/watch?v=lhMooyLGWkc

https://www.youtube.com/watch?v=kQZ5_8guYN8

https://www.youtube.com/watch?v=uwqR59xmN4A

https://www.youtube.com/watch?v=gNT4wn7K-Ag